

Just the Facts...

Eastern Equine Encephalitis

- Eastern equine encephalitis is a rare viral disease that is spread by infected mosquitoes.
- It is one of several mosquito-borne virus diseases that can affect the central nervous system and cause severe complications and death.
- Eastern equine encephalitis is found mainly in the U.S. along the eastern seaboard states and the Gulf Coast.
- There is no specific treatment for eastern equine encephalitis, only supportive care.
- Prevention centers on controlling mosquitoes and avoiding mosquito bites.



What is eastern equine encephalitis (EEE)?

Eastern equine encephalitis is a rare disease that is spread to horses and humans by infected mosquitoes. It is among the most serious of a group of mosquito-borne virus diseases that can affect the central nervous system and cause severe complications and even death. Other, similar diseases are western equine encephalitis, St. Louis encephalitis, and LaCrosse encephalitis.

What is the infectious agent that causes eastern equine encephalitis?

Eastern equine encephalitis is caused by the eastern equine encephalitis virus, an arbovirus. Arbovirus is short for **arthropod-borne virus**. Arboviruses are a large group of viruses that are spread by certain invertebrate animals (arthropods), most commonly blood-sucking insects. In the United States, arboviruses are spread mainly by infected mosquitoes. Birds are the source of infection for mosquitoes, which can sometimes transmit the infection to horses, other animals, and, in rare cases, people.

Where is eastern equine encephalitis found?

Eastern equine encephalitis is found in North America, Central and South America, and the Caribbean. In the United States, most cases have been reported from the eastern seaboard states, the Gulf Coast, and some inland Midwestern areas.

How do people get eastern equine encephalitis?

The eastern equine encephalitis virus has a complex life cycle involving birds and a specific type of mosquito, *Culiseta*

melanura, which lives in marshes and swamps. These mosquitoes feed only on birds; they do not feed on humans and other mammals. In rare cases, however, the virus can escape from its marsh habitat in other mosquitoes that feed on both birds and mammals (including horses and humans). These mosquitoes can transmit the virus to animals and people. After infection, the virus invades the central nervous system, including the spinal cord and brain.

What are the symptoms of eastern equine encephalitis?

Many people who are infected with eastern equine encephalitis virus show no symptoms. In other people, symptoms range from mild flu-like illness, with fever, headache, and sore throat, to encephalitis (inflammation of the brain), coma, and death. The number of symptomatic people who die from the disease is 35%, making it one of the most pathogenic mosquito-borne diseases in the United States. About 35% of people who survive the disease suffer permanent brain damage and some require lifetime institutional care.

How soon after exposure do symptoms appear?

Symptoms usually appear 4 to 10 days after the bite of an infected mosquito.

How is eastern equine encephalitis diagnosed?

Diagnosis is based on tests of blood or spinal fluid.

Who is at risk for eastern equine encephalitis?

Anyone can get eastern equine encephalitis, but some people are at increased risk:

- People living in or visiting areas where the disease is common;
- People who work outside or participate in outdoor recreational activities in areas where the disease is common;
- People over the age of 50 and younger than 15 are at increased risk for severe disease.

What is the treatment for eastern equine encephalitis?

There is no specific treatment for eastern equine encephalitis. Antibiotics are not effective against viruses, and no effective anti-viral drugs have been developed. Therapy is supportive only, directed at relieving the symptoms and preventing complications.

How common is eastern equine encephalitis?

Eastern equine encephalitis is a rare disease. Since 1964, 163 cases have been confirmed in the United States. Fewer than 5 cases are reported in most years. Although small outbreaks of human disease have occurred in the United States, epidemics in horses can be common during the summer and fall.

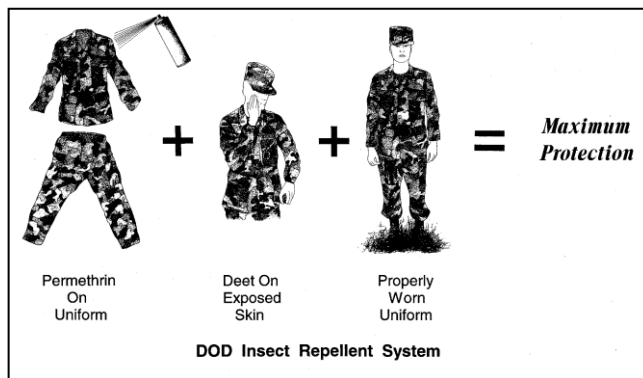
Is eastern equine encephalitis an emerging infectious disease?

Yes. Eastern equine encephalitis virus was first isolated in the United States in 1933. The risk of exposure has been increasing as people move into previously undeveloped areas where the virus lives. Deaths in horses are a sign of increased spread of the virus in a community.

How can eastern equine encephalitis be prevented?

A vaccine is available for horses, but not for humans. Prevention centers on public health action to control mosquitoes and on an individual action to avoid mosquito bites. Prevent mosquito bites:

- If possible, stay inside between dusk and dark when the mosquitoes that transmit the eastern equine encephalitis virus are most active.
- Use bed nets if sleeping in areas that are not air-conditioned or not well-screened.
- When outdoors during times that mosquitoes are biting, wear long-sleeved shirts and long pants.
- Use mosquito repellents on skin and clothing.
- Use insect repellents that have been approved by the Environmental Protection Agency (EPA). They are safe and effective.
- For your skin, use a product that contains 20-50% **DEET** (N, N-diethyl-meta-toluamide). DEET in higher concentrations is no more effective.
- Use DEET sparingly on children, and don't apply to their hands, which they often place in their mouths.
- Apply DEET lightly and evenly to exposed skin; do not use underneath clothing. Avoid contact with eyes, lips, and broken or irritated skin.
- To apply to your face, first dispense a small amount of DEET onto your hands and then carefully spread a thin layer.
- Wash DEET off when exposure to mosquitoes ceases.
- For your clothing, use an insect repellent spray to help prevent bites through the fabric. Use a product that contains permethrin. Permethrin is available commercially as 0.5% spray formulations. In addition, factory permethrin-impregnated clothing is now available.
- Permethrin will withstand numerous launderings.
- Permethrin should only be used on clothing, never on skin.
- When using any insect repellent, always FOLLOW LABEL DIRECTIONS.
- Do not inhale aerosol formulations.
- For optimum protection, soldiers should utilize the **DOD INSECT REPELLENT SYSTEM**. In addition to proper wear of the battle dress uniform (BDUs), which provides a physical barrier to insects, this system includes the concurrent use of both skin and clothing repellents:
 - Standard military skin repellent: 33% DEET lotion, long-acting formulation, one application lasts up to 12 hours, **NSN 6840-01-284-3982**.
 - Standard military clothing repellents, either aerosol spray, 0.5% permethrin, one application lasts through 5-6 washes, **NSN 6840-01-278-1336**; or impregnation kit, 40% permethrin, one application lasts the life of the uniform (at least 50 washes), **NSN 6840-01-345-0237**.



Where can I get more information on eastern equine encephalitis and other forms of mosquito-borne viral encephalitis?

Contact the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Aberdeen Proving Ground, Maryland 21010-5403; DSN 584-3613; CM (410) 436-3613; FAX -2037; or visit our website at: <http://chppm-www.apgea.army.mil>. Additional information can also be obtained from your local, county or state health departments, your health care provider or by visiting the website of the Centers for Disease Control and Prevention (CDC): <http://www.cdc.gov/ncidod/dvbid/index.htm>

Much of the information on Eastern Equine Encephalitis that is contained in this fact sheet was obtained from the Directors of Health Promotion and Education (DHPE). The information in this fact sheet is intended as guidance only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health care provider.